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14. ABSTRACT This year-two annual report describes the research activities and results of Year 2 activities, especially for Phases 2 and 4. All of the Phase 1 and 3 milestones were completed during the first contract year, and the details have been reported in the Year 1 annual report and in the descriptions of project accomplishments in the first four quarterly reports, and the Year 1 annual report. A six month no-cost extension has been approved so this report will describe activities of Year 2 and will report on Phases 2 and 4 progress; but, the project and analyses remain ongoing at this time. Phase 2 data collection has been completed, reflecting 82 IRMQ questionnaires and 51 unique projects. Early analyses on a sub-portion of the total IRMQ data are reported herein. Phase 4 is now ongoing - a testbed environment has been created for the validation of selected derivative models, indices, processes, and outcomes within an applied platform. Also Year 2 saw the establishment of the Institute for Triple Helix Innovation as a 501(c)3 non-profit organization. The knowledge derived from this project represents seminal research for determining complex models and metrics for accelerating innovation in the United States.

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Table of Contents

Introduction

There is growing interest among international policy makers, research institutes, and leading international organizations concerning the contributions possible through government, academic, and industry, or triple helix partnerships. This interest reflects increasing awareness of the value of science-based growth and the recognition in the need for effective public-private cooperation to help achieve national and social objectives (Wessner, 2002). Historically, research in the United States was accomplished almost exclusively within the university environment. In the early 1900's, both government and industry initiated their own R & D programs. Academia, industry and government thereafter represented the three primary sponsors of research, each sector working independently to achieve distinct aims and objectives. More recently, the independence of these entities has shifted so greater overlap amongst the sectors has emerged. The emergence of a global, knowledge-based economy has dramatically transformed the relationships between the sectors including their function, roles and ways of partnering. An international paradigm shift is taking place that values and promotes public-private collaboration among industry consortia, university linkages and government agencies, with an emphasis on commercialization (Asheim & Coenen, 2004; Leydesdorff, 2005; Leydesdorff & Etzkowitz, 2001; Shapira, 2002). This triple helix of university, industry, and government represents a new way of thinking about innovation where the interaction of disparate disciplines and sectors is the agent that catalyzes and accelerates innovation. In this model, trilateral collaborations are the key for energizing partners to address local and national concerns through funded research programs, thereby leveraging human and material resources to generate solutions while furthering the acquisition of new knowledge.

The overall goal of the grant, 'Building an Institute for Triple Helix Innovation in the Pacific Region' is to establish an enduring program of research and partnering wherein the benefits and challenges associated with university-industry-government, or triple helix collaborative innovation, are able to be empirically derived and validated. The building of the Triple Helix Institute is intended to establish a singular resource for sourcing, amalgamating, analyzing and distributing information related to collaborative innovation. The Institute research enables the emergence of platforms, models and methodologies for promoting local, national, regional and international partnerships that stimulate and accelerate innovation. The four phases of the project were defined as foundational research for quantifying the value of trilateral partnering and to distill best practices and future directions for building novel partnerships that enable new knowledge flows, profit and social good.

The Institute's research for this granting period has explored trilateral collaboration and innovation capacity in 6 Pacific region locales (i.e. Hawaii, California, Washington, Singapore, Japan & China) through an intensive collection of 10-year retrospective metrics (1994-2004). The time series describe capacity for innovation as measured by patents, trademarks and other innovation indicators, and the amount of R&D expenditures. Megatrends are used to indicate a widespread trend of major impact, composed of sub-trends which in themselves are capable of major impacts. The time series data were used to conduct retrospective Megatrend Analyses that focus on four dimensions: demographic developments, ecological sustainability, economic

trends, and technological progress. Megatrend Analyses were also used to develop Innovation Indexes for each of the 6 locales. The Indices provide define salient indicators of innovation potential for each local individually; and, taken together, describe main elements characterizing the Pacific Region innovation system. The Indices also provide insight into innovation drivers, IP, and human and fiscal resources over the 10-year period. Data dictionaries, methodology and details of the Innovation Indexes are available for review at:
http://www.triplehelixinstitute.org/projectInfo/megatrend.html

The Institute has also examined the benefits and challenges associated with trilateral innovation (Academia – Industry – Government) compared with outcomes of singular endeavors (Academia; Industry; Government) and dual-partner models (Academia-Industry; Academia-Government; and, Industry-Government) under variable circumstances. As an offshoot of Year 1 work, the Institute received an NSF grant: *Examining the Link between Informal Social Networks and Innovation: Using Netometrics to Quantify the Value of a Distributed Hetarchical Network.* Self-report questionnaires, social node analysis (SNA) and customized network monitoring tools (CNMTs) will be employed to identify variables promoting innovation in distributed networks.

Finally, as part of the Institute research, distributed communities of practice were established and qualitative and quantitative data have been collected to glean better understanding of how knowledge is created and transferred in on-line environments. Early outcomes of the Institute's Year 1 research suggest that talent and discovery in distributed knowledge clusters, such as CoP, are effective in enabling innovation.

Body

The Approved Statement of Work for this contract is divided into four phases:

Phase 1 (8 months): The collection of trend data for six Pacific region locales. Data are to be used to conduct a time-series megatrend analysis that focuses on four dimensions (i.e., economic trends, ecological sustainability, technological progress, and demographic development) across a 10-year span. Phase 1 data are also to be used to calculate a 10-year Summary Innovation Index that will allow for longitudinal comparison of each respective locale.

Phase 2 (12 months): The evaluation of seven types of research models (i.e., academic; industry; government; academic / industry; government / industry; academic / government; and, academic / industry / government) and their application to a health technology area. Questionnaires distributed to lead investigators at each research site will collect data on various Inputs, Outputs, and Impacts of each research project. A number of co-investigators at each site will provide additional data regarding the perceived benefits and costs of each type of research model. A series of multivariate analysis on the data sets will result in a set of indices that best represent the various Inputs, Outputs and Impacts of each research model. These analyses will also allow rank ordering of the seven types of models based on a number of weighted criteria, and will serve as the basis from which to determine the minimum criteria associated with successful performance of triple helix organizations under a variety of conditions.

Phase 3 (8 months): Development of a distributed community of practice. The community of practice will bring together a team of culturally diverse, interdisciplinary researchers from university, industry, and government communities. Phase Three will coincide with Phase Two in that members of the community of practice will assist with further development and refinement of all measurement tools, identify research projects that represent each of the seven types of research models, develop mechanisms and processes for evaluating and expanding the community of practice to advance knowledge spillover that can facilitate new triple helix research collaborations, and systems for innovation.

Phase 4 (6 months): Phase 4 is the creation of a testbed for the validation of selected derivative models, indices, processes, and outcomes within an applied platform. Codified knowledge and the core database are the foundation for the generation of multiple strategic tools, including exportable models of triple helix innovation, knowledge solutions, policy synergies, diverse project collaborations, and innovative technologies development. Selected pilot initiatives are examining the capacity of triple helix strategies to promote rapid commercialization of new products; generate industry spin-offs; identify economic returns, proxies of innovation and knowledge (e.g., patents, licenses, publications, etc.); and evoke collaborative partnerships that transform knowledge and innovation into social and commercial benefit. Triple helix initiatives are being used as pilots, to substantiate specified outcomes and index the immediate and long-term values associated with triple helix strategies and identified collaborative projects.

This annual report describes the research activities and results of Year 2 activities. All of the Phase 1 and 3 milestones were completed, and the details can be found in the description of project accomplishments in the first six quarterly reports. The final project report will describe further research outcomes, especially final results related to Phase 2 and 4 of the statement of work.

Administrative note:
Numerous difficulties arose with the project's fiscal agent (UCERA) during the second year of the contract. UCERA was consistently unable to successfully execute essential aspects of the Triple Helix contract. The progress of the project milestones and deliverables was slowed considerably by these administrative problems. UCERA was unable to complete basic contract functions including payroll; bill payment; stipend payment; and, reimbursements within a reasonable and timely manner (with consistent delays of more than 90 days in all areas); as well as other contract duties including hiring; arranging for needed consultants; purchasing and paperwork completion. Remediation plans to address these problems were discussed and an acceptable plan for transferring the balance of the grant to the Institute was agreed to by UCERA and USAMRAA. The plan identifies a formal HR relationship with Research Corporation of the University of Hawaii (RCUH). UCERA and the Institute agreed to make this transfer and RCUH has been contracted with for the provision of HR services. A six month no-cost extension was requested and approved in order to successfully complete the work of this project and to accomplish all related deliverables (**Appendix A**).

The Institute developed a revised budget and timeline of deliverables to reflect to the six month extension and funds transfer (**Appendix B and Appendix C**). This was coordinated with UCERA and the appropriate government representatives for the transfer of the Cooperative Agreement from the fiscal agent to the Institute for Triple Helix Innovation. This fund transfer was completed in the eighth quarter and reported on fully in the Q8 report. In order to prepare for a successful and positive funds transfer, and to provide a strong foundation for future planning, the Institute engaged in a full "Management Review" (See **Appendix D**) including a comprehensive review of financial and administrative mechanisms in place; the development of a plan for the grant transfer and a checklist of all needed assurances and certificates for receiving the funds; securing all required Representations and Certifications to accept federal funding including: a Certificate of Environmental Compliance, PI Safety Assurance, Facility Safety Plan, and, other documents as required. The Institute has also developed a Strategic Plan (See **Appendix E**) detailing Institute objectives and strategies for achieving major milestones that will ensure the success of this project when the grant transfers to the Institute. Included in the Strategic plan are immediate term (1 year or less), short term (1-3 years), and long term (5-10 years) goals and objectives focused diversified funding and eventual sustainability.

Planning has yielded a smooth transition trajectory to establish sound infrastructure for grant administration and to seamlessly move staff from UCERA to RCUH. On November 1, 2008, the Institute was in receipt of the October 1, 2008 contract modification and transfer of funds. The changeover of fiscal administration for the grant will take effect November 1, 2008.

Phase 1 Results

All aspects of Phase 1 were completed by the third quarter of this project and details have been reported in the Year1 Annual Report. These include: Trend data collection for the six locales; the preparation of data dictionaries; the performance of Megatrend analyses; and the development of Innovation Indexes that provide analytical measures reflecting the changing magnitudes and mixes of technological, economic, demographic and ecological factors related to innovation in the six locales.

Phase 2 Results

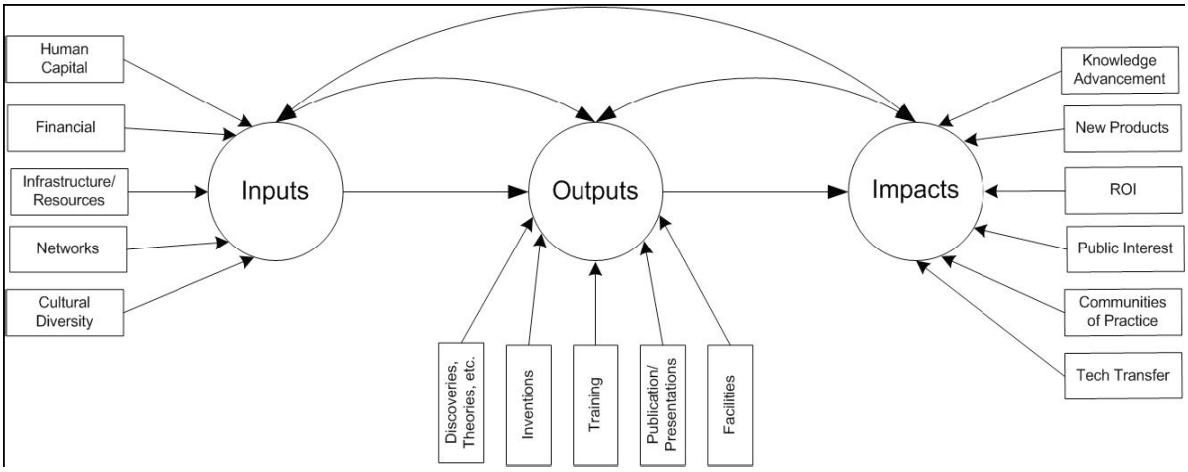
Innovative Research Model conducted in Phase 2

1 INTRODUCTION

The Institute conducted the Innovative Research Model study in six Pacific region locales (Hawaii, Washington, California, China, Singapore and Japan) to quantify the value of different kinds of collaboration and to identify specific criteria that are associated with successful collaborations and innovation systems. In order to measure the categories of inputs, outputs and impacts of collaborative models, the Innovative Research Models Questionnaire (IRMQ) was created by adapting existing validated measures that focus on innovation to attain feedback from innovators and researchers in six Pacific regional locales. The Institute's Community of Practice members recruited project principle investigators and team members in 2007. The surveys were made available on a password protected website and translated into Japanese and Chinese to facilitate data collection in Japan and China.

Determining appropriate indicators of success for each of the seven types of collaborative research models is challenging. The seven types of models are defined as: 1) Triple helix (academia-industry-government); 2) I-A (industry- academia) partnerships; 3) A-G (academia - government) partnerships; 4) G-I (government-industry) partnerships; 5) Industry only; 6) Academic only; and 7) Government only. Jaffe (1998) categorizes performance measurement indicators as "inputs," "outputs," or "impacts." Emphasizing and understanding these measurement indicators requires targeted data collection, measurement development, strategic selection of performance measures, flexible assumptions about each type of innovation model, and expert feedback at various stages of assessment. Our primary aim was to find indicators that could be widely accepted and that function as proxies or correlates for the various paths of knowledge flow associated with each type of model (see Figure 1).

Figure 1. Hypothesized Relationship Among Inputs, Outputs and Impacts in Collaborative Research Models



Input measures have obvious limitations, particularly because they are concerned with intent rather than success. For example, the awarding of competitive peer reviewed research grants are perhaps a good input proxy, but are still a measure of promise and not a guarantee of output. Similarly, input measures such as industry sponsorship of research can be used as a proxy for industry-driven collaboration, as well as a correlate of knowledge transfer (see Table 1).

Outputs are more easily measured as products or deliverables of each collaborative research model, such as patents, licenses, scientific publications, degrees awarded, and CRADAs. *Impacts* focus on the effects that can be directly or indirectly traced back to each organization as a result of its research innovation. These measurements include things like commercialization of research, venture capital financing, employment, license royalties, new product announcements, new product sales, paper citations, patent citations, ROI, and business spin-offs.

Table 1. Inputs, Outputs, Impacts of Collaborative Research Models

Category/Construct	Proxy Measure
Inputs	
Financial	Total R&D funding, external R&D funding, % funding to students , distribution of funding (e.g., %equipment, %salaries, etc.)
Infrastructure/Resources	Physical distance between research partners, physical research space (sq. ft.), cultural similarity among research partners, size and age of research organization
Networks	type of communication channels (e.g., e-mail, in-person, phone, etc.), number of grant/supplement submissions, investment of financial or human resources
Human Capital	number of employees, interdisciplinarity, employee turnover, personnel qualifications
Cultural Diversity	languages spoken, rural/urban region,
Outputs	
Ideas, Discoveries, Theories	papers, prizes, awards, conferences/presentations
Inventions	patent filings, invention-disclosures, copyright registration, trademark registration
Training	degrees obtained
Tech Transfer	CRADAs, cost-shared dollars
Facilities	additional space
Impacts	
Knowledge Advancement	scientific publications, citations, expert evaluations
New Products	patent citations, licenses, license royalties, product announcements, new product sales
Income Growth	cost/benefit ratio, rate of return, spin-offs, induced investment
Public Interest	news articles, non-technical reports, marketing
Cooperation and Knowledge Flow	CRADAs

The IRMQ is composed of three parts: Part One focuses specifically on the identified research project; and Part Two asks for information about the composition of project's research team; and Part Three asks for additional information about the respondent and her/his experiences with various types of research models.

Questionnaire data from each locale was collected representing the different types of research models. Information includes non-propriety data about the perceived benefits, challenges, assets and costs related to each type of research model. A series of multivariate analysis to model the various inputs, outputs and impacts associated with collaborative models. These indices will serve as the basis from which to determine the minimum criteria associated with successful performance of specific types of research models under a variety of conditions.

The data collection period ended in August 2008 and data analysis is in progress. Data were collected from 51 unique projects and 82 principal and co-investigators. Preliminary results show strong support for public-private collaboration leading to greater innovation, especially triple helix collaboration. The following preliminary findings are reported here on a preliminary data set of 42 projects. The following tables represent the type of analysis being performed and some descriptive statistical information. The Institute has been granted a six month no-cost extension. Thus, any conclusions drawn from the data so far represent early findings and interpretations remain preliminary. Conclusive findings will be reported in the final report and will reflect complete analyses..

2 DEFINITIONS

In this section, a set of definitions is laid out to define the parameters being used for analyses. Innovation is not a singular definition. In order to complete analyses, quantifiable variables must be defined.

In the following tables, "collaboration" has been defined as having partners outside of one's own department. These collaborators are categorized as either internal or external and also by sector type. Collaborators within a particular organization are considered "internal partners". "External partners" are those in different organizations. The "type of collaborator" can be academic (a), industry (i), or government (g). If the collaborators, internal or external, are of the same sector, this is categorized as "single helix collaboration". If two types are involved, it is "double helix", and if three are collaborating, it is defined as "triple helix collaboration".

Innovation is measured by the following "innovation activities": awards; grant proposals; patents; patent applications; and intellectual property (copyright, registration, filing of rights, etc.). *Innovation is considered present if any of these activities were reported*. The innovation measure is the number of types of innovation activity present. Therefore, if the project PI reported that an award was received and patent applications were filed, but the other indicators were not present, the innovation measure would be two. The more types of innovation activity reported, the higher the innovation measure is according to this calculation.

"Primary dissemination" refers to papers and articles disseminated for the target audience of the innovation. Other dissemination refers to information presented or published in less technical language for other non-target audiences. These factors and the importance of marketing on innovation are being examined as well.

3 INNOVATION ACTIVITY

The following table shows the overall distribution of research outcomes thought to serve as proxy measures for innovation such as awards, grants, patents received, patent applications, intellectual property, etc.). Such innovation activities were reported by 85.7% of the analyzed projects (see Innovation in the Table 2 below).

Table 2. Distribution of Innovation Activities

Innovation Description	N	Ratio
Awards	40	0.125
Grants	41	0.463
Patents	42	0.238
Patent Applications	42	0.190
Intellectual Property	42	0.666
Innovation	42	0.857
Primary Dissemination	42	0.238
Other Dissemination	42	0.095

4 EXTERNAL COLLABORATION BY ORIGINATOR TYPE (SECTOR)

This next table shows the distribution of projects collaborating with external partners and categorized by originating sector type. The categories of the collaboration type are based on combinations of the originator and partner origin type (a=academia, g=government, i=industry) but not combination of partners. More detailed collaboration definitions and measurements based on the combination of partners are being developed. This data are also being analyzed to see if collaboration originating in a specific sector is more or less successful in terms of innovation than those originating in other sectors. From these analyses, the Institute is beginning to define new metrics for innovation, specifically related to the kinds of collaborations in which researchers engage. The quantification of value associated with the single, double and triple helix collaborations will provide an evidence base for developing new models for accelerating innovation.

Table 3. Frequency of Collaborations by Originator Type

Frequency of Collaborations by Originator Type													
COLLABORATIONS (External Partners)		**Collaboration Type**											**Total**
		Acad only a->_	**Acad to Acad a->a**	**Acad to Gov a->g**	**Acad to Ind a->i**	**Gov only g->_**	**Gov to Acad g->a**	**Gov to Gov g->g**	**Gov to Ind g->i**	**Ind only i->_**	**Ind to Acad i->a**	**Ind to Gov i->g**	**Ind to Ind i->i**	
Frequency	**NONE**	3	5	0	0	2	0	0	0	4	0	0	1	15
Percent		7.14	11.90	0.00	0.00	4.76	0.00	0.00	0.00	9.52	0.00	0.00	2.38	35.71
Row Pct		20.0	33.33	0.00	0.00	13.3	0.00	0.00	0.00	26.60	0.00	0.00	6.66	
Col Pct no		100.00	50.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00	0.00	0.00	100.00	
Frequency	**YES**	0	5	8	2	0	2	1	1	0	4	4	0	27
Percent		0.00	11.90	19.05	4.76	0.00	4.76	2.38	2.38	0.00	9.52	9.52	0.00	64.29
Row Pct		0.00	18.51	29.62	7.40	0.00	7.40	3.70	3.70	0.00	14.81	14.81	0.00	
Col Pct no		0.00	50.00	100.00	100.00	0.00	100.00	100.00	100.00	0.00	100.00	100.00	0.00	
Total		3	10	8	2	2	2	1	1	4	4	4	1	42
		7.14	23.81	19.05	4.76	4.76	4.76	2.38	2.38	9.52	9.52	9.52	2.38	100.00

5 ANY COLLABORATION TYPE

It is important to understand what type of collaboration is being accomplished, and whether the collaborations are internal to an organization or they reach across organizational boundaries. The same type of analysis based on the originator of any type of collaboration (internal or external) is presented in the next table (Table 4). A significant number of projects (36.4%) involve collaboration with the same organization type (a->a, g->g, and i->i). Specifically, academia-to-academia collaboration (a->a) accounted for 30.3% of total of the any collaboration. A more advanced metrics is needed to differentiate internal collaborators.

Table 4. Frequency of Collaborations by Originator Type

Frequency of Collaborations by Originator Type													
Collaborations (Any Type)	**Collaboration Type**												**Total**
	Acad only a->_	**Acad to Acad a->a**	**Acad to Gov a->g**	**Acad to Ind a->i**	**Gov only g->_**	**Gov to Acad g->a**	**Gov to Gov g->g**	**Gov to Ind g->i**	**Ind only i->_**	**Ind to Acad i->a**	**Ind to Gov i->g**	**Ind to Ind i->i**	
Frequency **NONE**	3	0	0	0	2	0	0	0	4	0	0	0	9
Percent	7.14	0.00	0.00	0.00	4.76	0.00	0.00	0.00	9.52	0.00	0.00	0.00	21.43
Row Pct	33.33	0.00	0.00	0.00	20.00	0.00	0.00	0.00	40.00	0.00	0.00	0.00	
Col Pct no	100.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	
Frequency **YES**	0	10	8	2	0	2	1	1	0	4	4	1	33
Percent	0.00	23.81	19.05	4.76	0.00	4.76	2.38	2.38	0.00	9.52	9.52	2.38	78.57
Row Pct	0.00	31.25	25.00	6.25	0.00	6.25	3.13	3.13	0.00	40.00	40.00	3.13	
Col Pct no	0.00	100.00	100.00	100.00	0.00	100.00	100.00	100.00	0.00	100.00	100.00	100.00	
Total	3	10	8	2	2	2	1	1	4	4	4	1	42
	7.14	23.81	19.05	4.76	4.76	4.76	2.38	2.38	9.52	9.52	9.52	2.38	100.00

6 COLLABORATION AND INNOVATION

Table 5 shows a frequency table between collaboration (any type) and the presence of any innovation activity. It shows that just 'any' collaboration type is not enough to understand the difference in the level of innovation. Specifically, row percentages (in bold) show no significant differences in the innovation percentages when comparing between two any-collaboration-type outcomes (NONE and YES). Furthermore, that only 77.8% projects with innovation had some type of collaborators while 83.33% of projects without innovation had any collaboration, which is contradictory to expectations. In the next section, these categories are broken down further in different types of collaboration types or models to better understand the role that collaboration plays in innovation outcomes.

Table 5. Collaboration (any type) by Innovation

Collaboration by Innovation			
Collaborations (Any type)	**Innovation**		**Total**
	No	**Yes**	
Frequency **NONE**	1	8	9
Percent	2.38	19.05	21.43
Row Pct	**11.11**	**88.89**	
Col Pct no	16.67	22.22	
Frequency **YES**	5	28	33
Percent	11.90	66.67	78.57
Row Pct	**15.15**	**84.85**	
Col Pct no	83.33	77.78	
Total	6	36	42
	14.29	85.71	100.00

7 TRIPLE HELIX INNOVATION

Table 6 shows a similar analysis but now with three subgroups based on collaboration type or model. Specifically, single helix model or no collaboration is presented in the first grouping (row). Double helix collaboration model is based on collaboration where the originator is in a different sector from the other collaborators. Triple helix collaborations are those where all three sectors are represented in the collaboration.

The triple-helix collaboration model shows 100% success rate versus 86.7% and 73.3% success rate for two other cases. This analysis of three different collaboration models is very promising. However, these are preliminary findings and must be interpreted with caution. Further analyses on the complete data set with more refined collaboration measurements will elucidate these findings further.

Table 6. Single, Double, and Triple Helix Collaboration Model by Innovation

Collaboration Model by Innovation				
Collaboration Model		**Innovation**		**Total**
		No	**Yes**	
Frequency Percent Row Pct Col Pct no	**SINGLE HELIX**	2 4.76 13.33 33.33	13 30.95 **86.67** 36.11	15 35.71
Frequency Percent Row Pct Col Pct no	**DOUBLE HELIX**	4 9.52 26.67 66.67	11 26.19 **73.33** 30.56	15 35.71
Frequency Percent Row Pct Col Pct no	**TRIPLE HELIX**	0 0.00 0.00 0.00	12 28.57 **100.00** 33.33	12 28.57
Total		6 14.29	36 85.71	42 100.00

8 COLLABORATION MODEL AND INNOVATION MEASURE

A more detailed analysis of innovation versus collaboration model (type) is presented in the next table. Specifically the collaboration model is presented across different innovation groups based on a weighted innovation measure. The innovation measure was defined in section one as the sum of the types of innovation activity present. Therefore, the more types of innovation activity reported, the higher the index in the current calculation. The triple helix collaborations all reported some type of innovation, and had the most projects with innovation measure equal to 4 (see triple helix column percentages in bold).

Table 7. Triple Helix Collaboration by Innovation

Collaboration Model by Innovation Measure							
Collaboration Model		**Innovation Measure**					**Total**
		0	**1**	**2**	**3**	**4**	
Frequency Percent Row Pct Col Pct no	**SINGLE HELIX**	2 5.13 14.29 33.33	2 5.13 14.29 16.67	8 20.51 57.14 72.73	2 5.13 14.29 28.57	0 0.00 0.00 0.00	14 35.90
Frequency Percent Row Pct Col Pct no	**DOUBLE HELIX**	4 10.26 30.77 66.67	6 15.38 46.15 50.00	0 0.00 0.00 0.00	2 5.13 15.38 28.57	1 2.56 7.69 33.33	13 33.33
Frequency Percent Row Pct Col Pct no	**TRIPLE HELIX**	0 0.00 0.00 0.00	4 10.26 33.33 **33.33**	3 7.69 25.00 **27.27**	3 7.69 25.00 **42.86**	2 5.13 16.67 **66.67**	12 30.77
Total		6 15.38	12 30.77	11 28.21	7 17.95	3 7.69	39 100.00
Frequency Missing = 3							

Conclusion of Phase 2 Research Findings

The results reported here are promising. Early analyses appear to support the hypothesis that triple helix innovation model, where research involves a collaboration of academic, government and industry partners, may lead to greater innovation activity. The quantification of the cross-sector collaborating partners, as a means of better understanding innovation is new. By quantifying the value of cross-sector collaboration, and specifying the activities that are more or less likely to occur in collaborating partnerships, new models of innovation and innovation metrics will emerge. These early findings will be further explored over the remaining six months of the grant period in two ways. These data reflect a subset of the total data collected. The full data set will be analyzed to provide a more robust set of outcomes. New measurements and analyses will also be conducted to identify trends and specific conclusions. Further, the limitations of the data set will be clearly addressed. These findings will be available in the Final Report.

Phase 3 Results

During the fifth quarter, the remaining Community of Practice (CoP) meetings were completed, held via video and audio conference on 9/26, 10/23 and 11/28. The details of Phase 3 results were reported in the Year 1 Annual Report, including a summary of the data collected during that time. The 2008 Triple Helix Summit was held in February, 2008 and represented the second face-to-face opportunity for CoP members to review events of the CoP sessions, enumerate best practices and delineate future directions. The Summit also provided a venue for cross-sector dissemination of CoP findings. The information reported in the Year 1 Annual Report was presented to the SAGe and other cross-sector participants with focused discussion about application of these findings within the Phase 4 Testbed and respective initiatives.

Phase 4 Results

The goal of Phase 4 of this project is to establish a Testbed environment as an applied platform in which to validate derivative models, indices, processes, and outcomes accumulated through data collection and analysis, comprehensive literature review, and, best practices of Phases 1, 2 and 3. The testbed platform provides an iterative process to examine the capacity of triple helix strategies for promoting greater efficiencies in the development and commercialization of new products and processes; the enabling and leveraging of cross-sector resources; the identification of economic returns, proxies of innovation and knowledge (e.g., patents, licenses, publications, etc.); and the elicitation of collaborative partnerships that transform knowledge and innovation into social and commercial benefit.

The project's plans for testbed and initiatives implementation were delayed due to the administrative difficulties with the project's fiscal agent. However, new timelines have been established (**Appendix C**) to account for these delays and the subsequent 6 month no-cost extension. The testbed has now been successfully established and initiatives are ongoing. The Final Report, at the conclusion of the 6-month no-cost extension, will report the outcomes of these initiatives.

With the hiring of testbed initiative support staff, Phase 4 testbed initiatives were launched with full development plans, timelines, measurements of success, and milestones. The development to date of the initiatives within the testbed environment is proceeding according to the new timeline. A Community of Practice for the research managers associated with each of the initiatives was standardized and codified, based on the Year 1 derivative data. This information was and rolled out in training session, providing a formal training mechanism regarding the design, implementation and coordination of successful knowledge clusters or CoP's. This initiative planning and coordination was conducted via audio and video conferencing between CoP research managers, Institute staff and the PI. Training in best practices, steps in developing and sustaining Communities of Practice and tools, methods and templates were provided to the research managers over a period of 3 months. This provides the basis for the design and implementation of each of the initiatives and their respective CoP development (**Appendix F**).

Five initiatives were selected and implemented for testbed implementation as models of

interdisciplinary collaboration. These initiatives substantiate immediate and long-term values associated with triple helix strategies. The initiatives allow for the examination of the capacity of triple helix strategies to promote rapid commercialization of new products that enable human development; generate industry spin-offs; identify economic returns, proxies of innovation and knowledge (e.g., patents, licenses, publications, etc.); and evoke collaborative partnerships that transform knowledge and innovation into social and commercial benefit.

The rapid and dynamic pace of innovation is making traditional hierarchical structures for knowledge flow obsolete. More flexible mechanisms are required that allow fluid changes within emergent organizational forms. Communities of Practice (CoP) represent a special type of network that can emerge from a desire to share knowledge more effectively or to build systems among members of a particular discipline. Wegner and Snyder (2000) define a CoP as one where people share their experiences and knowledge in free-flowing creative ways so as to foster new approaches to problem solving, to develop new strategies, to transfer best practices, develop professional skills and to recruit and retain staff. The CoP is the essential component of a perspective on knowledge networks that informs the creation of learning systems at various levels of scale, from local communities, to single organizations, partnerships, cities, regions, and globally (Preese, 2004).

As part of its foundational research program, the Institute developed a prototypic Communities of Practice; defined best practices; and, developed information technology tools that support distributed CoP members in communicating effectively to achieve their common goals. The CoP established evidence-based tools, models, and strategies for cross-cutting collaboration and collected extensive questionnaire-based data that augmented the derivative model development. The application of these findings in five initiatives, within the applied testbed environment will allow for the validation of these initial efforts across issues, geographic settings, and organizational needs.

An overall objective of the Institute for Triple Helix Testbed is to validate emergent models and practices for multidisciplinary collaboration towards developing cost-effective and sustainable eHealth technologies and applications. The results of the collaborations will include novel tools, decision support systems and skills development projects that balance social, business, environmental and security interests of collaborator communities. Other objectives include new uses of technology and transfer of technology that improve readiness for global health threats and access to medical and non-medical resources. The Institute's early work has identified a suite of tools, services and strategies ranging from: networking applications that reduce risk and increase efficiency; to evaluating and making available replicable models of collaboration and innovation; to development of training and certification materials for healthcare and innovation managers to ensure standard high levels of transparency, efficiency in sharing resources through eHealth, and leveraging skills needed to facilitate and expedite interdisciplinary collaboration and innovation, especially in the eHealth and healthcare fields.

To achieve the stated objectives, the Institute's five initiatives were specifically designed to validate emergent triple helix and Community of Practice models while simultaneously addressing global eHealth issues identified by the World Health Organization, in support of UN Millennium Goals. These initiatives are developing a significant web presence that can provide visibility of and access to participating organizations, individuals and

networks to create a virtuous circle of innovation through increased access to emergent information, projects, expertise and platforms for co-creation amongst geographically dispersed individuals and communities.

Initiative 1a: eHealth Innovation - Collaboration with WHO

Initiative 1b: Research - Evidence Base - eHealth Standards and Norms

Initiative 1c: Collaboration - Rural Networks of eHealth Excellence

Initiative 2: Logistically Specific (Pacific region) – Innovation in the Asia-Pacific Region

Initiative 3: Industry Specific – DoD & Technology Readiness Levels

Initiative 1: Problem Specific – Global eHealth

The Institute for Triple Helix Innovation (the Institute) has engaged with the World Health Organization (WHO) in collaboration related to eHealth Innovation. The three Problem-Specific Global eHealth initiatives have been established to work synergistically to achieve this goal.

The three Global eHealth initiatives are aligned with the three areas of the Institute business plan (innovation, research, and collaboration). Individually, the initiatives explore the application of data and derivative models applied to the topic of global eHealth. Global eHealth applications represent specific focused areas for derivative triple helix model application. Roadmaps and timelines of these initiatives have been developed in collaboration with the WHO in support of Institute goals as well as WHO eHealth policies. Emphasis is being placed on the use of ICT in health, including the frameworks and tools supporting both policy and practice in ICT-based knowledge management and knowledge sharing and development of the evidence base, models and tools in eHealth. eHealth is one of five strategic directions of WHO's knowledge management strategy. The others are: access to health information; translating knowledge into policy and practice; sharing and are applying experiential knowledge; creating an enabling environment for knowledge management; and building capacity through access to health information, education, and training for individual providers, institutions, and the public. Resolution on eHealth (WHA 58_28) calls on member States to carry out activities in eHealth including: Long-term implementation ICT strategic plans; collaboration with private and non-profit sectors in ICT; reaching vulnerable communities with eHealth, appropriate to their needs; mobilizing multi-sectoral collaboration for determining evidence-based eHealth standards and norms; evaluating eHealth activities; establishing national centers and networks of excellence for eHealth best practices, policy coordination and technical support.

Initiative 1a: (*Innovation*) Collaboration with WHO on eHealth Innovation

There is little to guide eHealth policy makers in terms of an evidence base, evaluation methods, critical success factors and best practices, across a range of settings. Innovations in ICT are primarily from the private sector and do not necessarily reflect WHO and health sector priorities. Adoption in the health sector often occurs without comprehensive evaluation of the impact or value of ICT to

health services. Both the Institute and WHO strive to connect-the-dots in new ways to allow for better knowledge flow and for identifying new incentive to promote profitable yet socially-responsive tools, products and solutions.

The Institute Research Manager of Global eHealth Initiatives Bernice Bowers with the PI Dr. Leigh W. Jerome developed and implemented plans with WHO establishing three testbed initiatives. The first of these initiatives is with the Global Observatory for eHealth (GOe) and integrates representatives from nation states, regional non-governmental organizations, and subject matter experts within and outside of the WHO. The initiative provides global, cross-sector, multi-disciplinary engagement via the Institute's 3Helix platform to construct an integrated survey, in coordination with WHO, in order to assess eHealth capacity, infrastructure, needs and trends across the world. The Institute's triple helix tools and methodologies have been utilized to develop a significant colleague network for the GOe working group. Subgroups have formed within the GOe Survey Group to include representation from the Association of Southeast Asian Nations (ASEAN), the Centers for Disease Control (CDC), and the Organization for European Community Development (OECD).

In addition, significant relationships have been established through the GOe Secretariat with additional offices within the World Health Organization (WHO) particularly those in Knowledge Management, the Health Academy, and regional offices, supporting the opportunity for the Institute to become a WHO eHealth Collaborating Center.

Initiative 1b: (*Research*) Evidence Base - eHealth Standards and Norms

There is a focus on information management for the Institute to inform solution development and problem solving utilizing statistics and a global, collaborative, long-term approach for global benefit. The development of a strong evidence base is also a mutual goal in order to initiate International standards for ICT use. The WHO Knowledge Management Group, GOe, and Health Academy have all prioritized this area and eHealth standards as means of increasing efficiency of their outreach and that of host nations for public health programs and measurement of effectiveness of these efforts.

In order to validate the research findings of Institute efforts, early analyses are being compared with other emergent research findings, and work has begun assembling an American National Standards Institute (ANSI) standards committee to develop a workplan. The focus of this initiative, led by the Institute's Standards Development Research Manager, Victoria Garshnek, Ph.D., is the development of a social networking standard that will support trilateral collaborations and CoPs across fields, and those that would be applicable to the WHO as well.

The long term goal is the development of standards for new platforms, tools and strategies to include those that promote global health through distributed, cross-sector collaboration, as well as other disciplines.

Initiative 1c: (*Collaboration*) Rural Networks of eHealth Excellence

Collaboration is critical for the work of both the Institute and the WHO. Collaboration is a means for developing cost-effective models and for understanding the determinants in the adoption and sustainability of eHealth and successful integration of eHealth into health-care systems. WHO and the Institute recognize that the extraordinary value of ICT lies not only in the information that can be exchanged but also in their ability to bring people together to build and shape partnerships and a joint program of action, enabling more informed decision-making and more cost-effective use of resources.

The Institute for Triple-Helix Innovation recognizes that knowledge-based development is an endless transition of innovation rather than a single model for all economic, research and societal partnering. The exportable models and the tools and strategies for flexible partnering that are being developed require validation in specific regional locales and with regard to specific content areas as well as relative to various cultural, organizational and technologic contexts.

The Institute has developed a broad range of tools and evidence-based strategies for cross-cutting network collaboration through early research activities. Through this initiative, tools and strategies are being validated within an Asia-Pacific partnering network focused on Malaria, zoonotic diseases, and particularly those carried through the food and trade supply chain that represent a significant area of public health and disease control needs in the Asia-Pacific region due to cross-border migration, water and animal management, transport system and sanitation systems, veterinary and animal health practices, and lack of public health support specific to these areas. Within the Institute's rural public health network, cross-sector, multi-disciplinary information is being shared and synthesized for new knowledge creation. This initiative also allows models and tools to be tested with cross-sector organizations, geographic settings, discipline representatives, and collaboration model hybrids. Further, this initiative is developing a sustainable and enduring network of networks through which to more efficiently initiate, evaluate and document current and future zoonotic disease control, malaria control and other related efforts.

Initiative 2: Logistically Specific (Pacific Region) – Innovation in Asia-Pacific Region

The Institute for Triple Helix Innovation will apply its trilateral collaborative methodologies and tools to biotech/biopharmaceutical agencies located in the Zhongguancun Beijing and Tianjin Tech Parks. Originally designed as part of technology based economic development programs (TBED), these technology parks are examples of Pacific Region industry-government-academia clusters driven by industrial policy and engaged in: (1) extensive government-sponsored research and co-development partnerships; (2) academic-industry collaboration in product development and human asset development; (3) co-development between Chinese firms developing novel biotech products; and (4) international partnerships

This initiative comprises part of the Institute's testbed for its colleague network, triple helix methodologies, and tools. In September 2008, the Institute designed a CoP with the input of subject matter experts in Asia-Pacific cross-sector collaborative models to engage knowledge clusters in the region with which to test the Institute's services and products. The Zhongguancun Beijing and Tianjin Tech Parks represent a unique collection of cross-sector innovation activity in health biotechnology and biopharmaceutical development, particularly those engaged in novel product development in vaccines and diagnostics.

In particular, the Institute CoPs are focusing on topics such as unique cross-sector innovation taking place in the tech park knowledge clusters for example in innovative product development for SARS and avian influenza (H5N1) diagnostics, recombinant vaccines, and on further cross-sector collaboration stimulated by the CoPs between international partners to overcome barriers of language, cultural differences, the uncertainty around enforcement of intellectual property legislation and China's financial environment.

Initiative 3: Industry Specific – DoD & Technology Readiness Levels

Triple-helix partnerships facilitate the transfer of scientific knowledge in the development of tangible products and processes by fortifying organizational capabilities and harnessing complementary expertise that create new synergies between academia, industry and government. Trilateral partnerships can orchestrate research that targets public missions with specific local and national concerns, while simultaneously conducting virtuoso science.

The United States Department of Defense seeks innovative ways to conduct R&D in order to maintain technological superiority; uphold readiness posture; optimize infrastructure utilization; and respond optimally to the needs identified by military personnel. Collaborative research endeavors offer the best hope for developing new science and technology advances and solving critical problems that face the military. Triple helix research partnerships are considered the best promise for establishing long-term organizational structures that allow for short-term intensive collaboration experiences. Carefully constructed and evaluated partnerships offer society a proven means of enhancing technological developments, the welfare of U.S. citizens, and the security of the nation (National Academies Press, 2003).

This testbed initiative has been established in cooperation with the Telemedicine and Advanced Technology Research Center (TATRC) to explore the application of Triple Helix methodologies for enhancing technology transfer and dual-use product development. TATRC is at the forefront of triple helix collaboration due to its government-sponsored research programs, academic model of incremental testing and empiricism, and industry goals of technology transfer and product/system sustainability. Quantifying triple-helix methodologies means defining variables associated with project effectiveness, efficiency, and success, as well as documenting best practices, lessons learned, failed enterprises, conflicts of interest, and how barriers to collaboration have been successfully removed. A robust and enduring research program will allow for broad data collection and

analysis, longitudinal examination of diverse factors, and a perpetual feedback loop to permit the continual refinement of our understanding of the knowledge base while informing new projects and collaborative designs.

Five TATRC triple helix CoP are being established to validate the application of the derivative models and strategies when integrated with TATRC's product development lifecycle. Collaborations represent opportunities to leverage resources. By combining government expertise, assets, and resources with complementary contributions from the academic and private sectors, triple helix research partnerships offer a variety of benefits for those involved (Chang et al., 1999). A plan has been developed by the Research Manager, John Hustleby, that will establish five CoPs in order to validate the application of the Institute derivative tools and strategies when integrated with TATRC's product development lifecycle.

Phase I of the plan is to cultivate a community of practice focused on the Pacific Telehealth and Technology Hui in Honolulu. The domain for the CoP is "Sensor Technology Applications in the Life Sciences". A robust geographically distributed group of 15 physicians and scientists representing the three helices has been assembled to participate in this CoP. A series of eight CoP sessions will begin soon using the upgraded 3Helix.org collaborative platform. The participants in this CoP are working on projects representing a wide range of sensor technologies and will explore topics of common interest and share knowledge during the CoP sessions. This phase of the initiative tests both the 3Helix.org collaborative platform as well as the training module on cultivating triple helix Communities of Practice.

Phase II of the plan is to cultivate a community of practice focused on TATRC's Nano Medicine and Biomaterials portfolio which is managed by Dr. Warren Grundfest under the responsibility of TATRC's West Coast Field Office in Los Angeles, California. The list of potential domains for this CoP has been distilled to two possibilities. A decision will be made soon and a list of potential CoP participants will be developed from the 3 Helices. Six to eight CoP sessions using the 3Helix collaborative tools will begin at the same time or closely following the sessions for phase I. This phase of the initiative will also test both the 3Helix.org collaborative platform as well as the training module on cultivating triple helix communities of practice.

Phase III of the plan is broken into three sub-phases. Phase IIIa is to set up a Community of Practice for the five TATRC satellite Office Managers. Phase IIIb is to set up a CoP for TATRC's Bio-Monitoring Technologies portfolio which is managed by Dr. Eva Lai. Finally, Phase IIIc will establish a CoP for all 13 of TATRC's portfolio managers. The domains for two of these three CoPs are based on positions held within the organization of TATRC. The domain for the third CoP is based on a subject like the CoP in phases I and II. While this phase of the initiative will continue to test the 3Helix.org collaborative platform and the training module on cultivating triple helix Communities of Practice, it has a secondary objective of helping TATRC improve how it collaborates both internally and across all 13 of its portfolios. These CoPs will be launched in the December 2008 timeframe and eight sessions will be run for each CoP.

Other Important Accomplishments – Year 2

- During the 5th quarter, the project's web team completed the beta testing of the Zeitbrite innovation networking platform - this platform has now been re-named 3Helix.org. 3Helix.org has been released as a much improved version that includes additional features and a more robust interface. The 3Helix.org platform provides an electronic environment within which technology researchers, entrepreneurs, and managers can network with each other, collaborate on projects, vet new ideas, and build distributed teams. New functionality includes a photo montage area for visual collaboration, a "Commons" area for posting ideas and requests for solutions or cooperative efforts, and expanded document posting and management capabilities. The 3Helix platform was moved to its own server within the University of Hawaii's LILT lab – www.3helix.org - and all current beta users were asked to begin inviting colleagues to use the site.

- In addition to having the forum of the 2008 Triple Helix Summit itself for the presentations of the participants, the project has arranged for selected presentations to be further developed as papers and published in a special edition of a British research journal entitled, "the International Journal of Entrepreneurship and Innovation Management."

- The 2008 Triple Helix Summit featured a program outline and panel topics reflecting the Institute's research findings, and with initial invitations to speakers and panelists (**Appendix G**).

- The TATRC Initiative Researcher John Hustleby initiated the implementation and validation processes for Institute tools and methodologies with the PI Dr. Leigh W. Jerome and TATRC and TATRC West leadership. A three-phase plan has been developed that will establish five specific CoP series to validate the application of the derivative models and strategies when integrated with TATRC's product development lifecycle.

  Phase I of the plan is to cultivate a community of practice focused on the Pacific Telehealth and Technology Hui in Honolulu. Phase II of the plan is to cultivate a community of practice focused on TATRC's Nano Medicine and Biomaterials portfolio which is managed by Dr. Warren Grundfest. Phase III of the plan is broken into three sub-phases. Phase IIIa is to set up a community of practice for the five TATRC satellite Office Managers. Phase IIIb is to set up a CoP for TATRC's Bio-Monitoring Technologies portfolio which is managed by Dr. Eva Lai. Finally, Phase IIIc will establish a CoP for all 13 of TATRC portfolio managers. These CoPs will be launched in the December 2008 timeframe and eight sessions will be run for each CoP.

- The Global Health Initiatives Research Manager Bernice Bowers and PI Dr. Leigh W. Jerome developed and implemented the validation of Institute templates, best practices and tools with the WHO in support of (a) the GOe Thematic Working Group that includes a customized website with colleague

networking tools and activities, a main CoP group and subgroups addressing eHealth infrastructure and monitoring, and a commons for idea sharing and initiative development within the common mission of the CoP; and with (b) rural public health network subject matter experts focusing on the Mekong River region as a region with high levels of malaria, zoonotic diseases, humanitarian assistance and public health infrastructure issues.

- The Standards Research Manager Dr. Victoria Garshnek and PI Dr. Leigh W. Jerome developed an eHealth Standards and Norms initiative to validate the research findings of Institute efforts, working with ANSI to develop a standards committee to address a social networking standard that will support trilateral collaborations and CoPs across fields.

- The Asia-Pacific Research Manager Vincent Kimura, Global Health Initiatives Research Manager Bernice Bowers and PI Dr. Leigh W. Jerome developed an initiative to validate the Institute's trilateral collaborative methodologies and tools with biotech/biopharmaceutical agencies located in the Zhongguancun Beijing and Tianjin Tech Parks which are examples of Pacific Region industry-government-academia clusters driven by industrial policy. The initiative reveals region-specific elements of trilateral collaboration and universal responses to Institute tools and methods applied to: (1) government-sponsored research and co-development partnerships; (2) academic-industry collaboration in product development and human asset development; (3) co-development between firms developing novel biotech products; and (4) international partnerships in the Asia-Pacific region focused on innovation in the life sciences discipline and markets.

- A Management Review was completed as a thorough assessment of systems (fiscal and operational policies and procedures), structure (organizational structure and support services required), and staff (including new hires and hiring procedures and performance management approaches including project planning) (**Appendix D**).

- A Strategic Plan for the Institute was developed to provide a short-term, long-term, and immediate planning roadmap to achieve Institute funding and sustainability, and to achieve grant deliverables and the mission of the Institute and funding agency USAMRAA (**Appendix E**).

- The Institute has executed and secured all required documentation and certification as a 501.c.3 at the federal and state level needed to receive federal funding (**Appendix H**).

- The Institute has secured acceptance of the Pre-proposal for FY08 Congressional Funding for the work of the Institute in Triple Helix Innovation.

- The Institute designed, developed and implemented 11 trainings each running 1 ½ hours covered best practices, templates and tools to support knowledge clusters and CoPs for Institute CoP Coordinators beginning on June 24, 2008, and culminating with updates from the WHO GOe initiative and related best practices on September 26, 2008. These meetings were conducted online to test virtual

meeting technologies and multiple for a for sharing information including group webspaces and tools, and training was provided specifically in critical success factors in building CoPs including methods to build an active core group, templates to define membership and assign roles within the CoP, to build and sustain knowledge flows and participation that is beneficial to the participants and their organizations, and documented measurement systems to monitor the success and outcomes of CoPs.

- Bi-monthly SAGe meetings have been conducted throughout, with the latest meeting introducing Dr. Jonathan Rosen as the new chair. Dr. Rosen is leading four strategic initiatives for the Institute:
    - The Designation of the Institute as a Nationally Chartered Organization
    - Developing a hierarchy of sponsorship for the Institute
    - Creating strategic partnerships for sustainability
    - Defining a 5-year vision for the Institute

Key Research Accomplishments

- Five diverse initiatives were designed, developed and launched for the validation of triple helix methodologies and Community of Practice models. These are:

  Initiative 1a: eHealth Innovation - Collaboration with WHO GOe Secretariat in the development of a CoP on eHealth infrastructure, needs, and issues across the 193 nation states represented in the United Nations.

  Initiative 1b: Research - Evidence Base - eHealth Standards and Norms with ANSI to develop social networking standards

  Initiative 1c: Collaboration - Rural Networks of eHealth Excellence with regional and topical subject matter experts, the WHO Health Academy, focusing on the Mekong River Subregion and cross-sector collaborative approaches to mitigating and responding to malaria and other zoonotic diseases.

  Initiative 2: Logistically Specific (Pacific region) – Innovation in the Asia-Pacific Region focusing on biotech and biopharmaceutical industry-government-academia collaboration in two leading technology parks in the region, and testing Institute tools and methodologies in this highly culture-bound and government-planned environment.

  Initiative 3: Industry Specific – DoD & Technology Readiness Levels working with TATRC West and its product development lifecycle, cultivating communities of practice focused on the Pacific Telehealth and Technology Hui in Honolulu; TATRC's Nano Medicine and Biomaterials portfolio; the TATRC satellite Office Managers; TATRC's Bio-Monitoring Technologies portfolio ; and a group of all 13 of TATRC portfolio managers.

- A comprehensive search of the literature and national and international standards has determined that standards have not been established for social networks and social networking. Therefore, the Institute is undertaking a comprehensive, open, consensus-driven process to produce American National Standards Institute (ANSI) standards for social networks and social networking. The Institute initiated this effort with an application for Certification as an ANSI Standards Developing Organization (SDO) and achieved this status in January 2008 (**Appendix I**). The Institute is currently in the process of assembling a standards committee that will establish a work plan and prepare the standard.

- The Institute has collected numerous examples of cross-sector collaboration that illustrate the significant impact of trilateral partnering. Through these case studies, the Institute is able to illustrate variant models of triple helix partnerships and describe how these collaborations enhance innovation. Case studies provide a window into positive outcomes as well as the challenges associated with cross sector partnerships. The Institute will format and index these case studies in order to develop a series of booklets of in-depth analyses of five formatted case studies (**Appendix J**) along specific themes and issues. This series is entitled, the "Better

Together" series and will be available for public distribution (e.g., Summit participants, interested collaborators, etc.).

- Phase 3 data has been collected and analyses are underway to quantify the value of different models of academic-government-industry collaboration. Early analyses are promising and represent novel innovation metrics and great potential for increased understanding of the acceleration of innovation via cross-sector collaborations.

Reportable Outcomes

- The project's December 12, 2007, application on behalf of the Institute for Triple Helix Innovation to the American National Standards Institute (ANSI) to become a Standards Developing Organization in the area of social networking was accepted by the ANSI board of directors in January (**Appendix I**). The Institute must now initiate and manage the process of developing and adopting international standards for social networking.

- The Institute co-organized the Global Observatory for eHealth (GOe) Bellagio Conference with the WHO as a strategic workshop April 9-12, 2008. This event, funded by the Rockefeller Foundation brought together a select 21 eHealth experts from around the world to help plan for the Observatory. Participants included researchers, practitioners, academics and consultants (**Appendix K and Appendix L**).

- The Institute launched the GOe Survey CoP and group space including a colleague networking system in September 2008, with three working sessions per week for 5 weeks with WHO GOe Secretariat and members of the Survey Thematic Working Group. The group space was launched with 41 participants and has grown to 57 participants, a subgroup focused on eHealth in the Southeast Asia region, and survey comments from the group to assist the WHO GOe Secretariat finalize a UN-wide survey to identify eHealth ICT standards and infrastructure.

- Jerome, L.W. (2008). Building a global network: Knowledge clusters and transformative networks. World Health Organization: Global Observatory for eHealth (GOe), April 9-12, Bellagio, Italy (**Appendix M**).

- Jerome, L.W. (2008). Modular knowledge, knowledge clusters, and transformative networks. Invited Lecture, April 4, University of Newcastle, United Kingdom (**Appendix N**).

- Jerome, L.W. (2008). International knowledge and capitol Flows: Modular Knowledge and Transformative Networks. The Institute for Triple Helix Innovation, Triple Helix Summit, February 2-5, Honolulu, HI (**Appendix O**).

- The Institute coordinated briefings with representatives of the Korea Research Foundation including members of Republic of Korea national technology transfer

programs, university-industry partnership programs, and industry-government innovation management programs. Dr. Leigh W. Jerome presented Institute research findings and accomplishments, and discussed Korea participation in upcoming Summits and CoPs.

- Dr. Leigh W. Jerome, PI, attended meetings at WHO headquarters in Geneva to confer with Knowledge Management leadership of the WHO regarding collaborating center status and to discuss WHO Testbed initiatives and related deliverables. Meetings were held with Dr. Yunkap Kwankam, Dr. Misha Kay, and Dr. Joan Dzenowagis, and Dr. Diana Zandi to codesign these initiatives in a way that leverages the resources of the Institute and the WHO, while meeting the research validation and programmatic needs of both organizations.

- Jerome, L.W. (2008). Panel participation by PI, Dr. Leigh W. Jerome at the National Forum on the Future of the Defense Health Information System - "Optimizing Care for the Wounded Warrior," March 26-28, 2008, Georgetown University, Washington, DC. Dr. Jerome provided panel discussion related to Triple Helix Strategies as they apply to interoperability of health records (**Appendix P, Q and R**).

- US-PACOM - Critical Infrastructure Protections Resident/Intensive Training at US-PACOM, Hawaii, June 17, 2008. Professor Luis Kun invited Leigh W. Jerome, Ph.D. who spoke on Collaborative Innovation, Transformative Networks and Synchronized Multi-Disciplinary Teams (**Appendix S**).

- TATRC West - Dr. Leigh W. Jerome had meetings with Research Initiative Manager John Hustleby; COL Ron Poropatich; and Jessica Kenyon, Dir. TATRC West.

- Dr. Leigh W. Jerome participated in meetings with LARTA Institute and attended the TATRC sponsored Medical Innovation Engineering Challenge (Tuesday, May 20, 2008.)

- Dr. Leigh W. Jerome submitted a chapter entitled, "Triple Helix Knowledge Clusters: Accelerating Innovation and Creating Transformative Networks" for a book entitled, "Theory and Practice of Triple Helix Model in Developing Countries, Issues and Challenges." Edited by Mohammed Saad, Girma Zawdie, ISBN: 978-0-415-47516-7, June 2008 (**Appendix T**).

- The Institute has achieved federal 501.c.3 status, and has secured its Data Universal Numbering System registration, its Central Contractor Registration (CCR), its Trading Partner Identification Number (TPIN), and its Commercial and Government Entity Code (**Appendix H**).

Future Research Outcomes

The Institute conducted working meetings with key leaders and subject matter experts to help define areas resonant with the goals of the Institute, its tools and

methodologies, and to further shape cross-sector opportunities to build upon research conducted by the Institute to date.

- PI Dr. Leigh W. Jerome and Global Health Initiatives Research Manager Bernice Bowers met with Jennifer Goto Sabas, Esq., Chief of Staff, Office of Senator Daniel K. Inouye, to identify complementary federal projects that would benefit from the applications of the Institute's research, best practices and tools. These include public health related to animal-borne diseases and veterinary sciences in the Asia-Pacific region and Hawaii's role as a regional and national resource for early detection, cross-sector collaboration in identification, mitigation and response to these disease outbreaks.

- PI Dr. Leigh W. Jerome, Standards Initiative Research Manager Dr. Victoria Garshnek and Global Health Initiatives Research Manager Bernice Bowers met with Dr. Fred Burkle, Director of the Asia-Pacific Center for Biosecurity, Disaster & Conflict Research whose leadership of the Center of Excellence in Disaster Management & Humanitarian Assistance (COE) provides the Institute with a resource and subject matter expertise in this field. The briefing focused on federal programs that are seeking tools and techniques, best practices and methodologies for distributed knowledge clusters as part of a way to leverage federal funds with external resources including those of non-governmental organizations, foundations, academia and industry.

- PI Dr. Leigh W. Jerome and Global Health Initiatives Research Manager Bernice Bowers met with Dr. Karl Kim, Director of the National Disaster Management Training Center at the University of Hawaii Manoa to initiate planning of the Training Center's incorporation of Institute modules, methodologies, tools, and research in their training roadmaps for cross-sector disaster management teams needing to execute in a more nimble and flexible manner particularly with emergent and unpredictable community-based resources and new telecommunications capabilities and constraints as they develop within a complex emergency or disaster scenario.

- Continued analyses will provide more robust conclusions related to the quantification of government-academic-industry models of collaboration. These findings will be used to construct novel models of innovation and the acceleration of innovation.

Conclusion

The second year accomplishments for the grant, "Building an Institute for Triple Helix Innovation," are strongly focused on the completion of Phase 2 data collection and early analyses; and, the creation of the Phase 4 testbed environment and the initiation of the testbed initiatives.

The problems commonly faced across sectors, disciplines and geography are often of the most fundamental nature: How do we keep pace with dynamic and shifting demands?; How are relationships established and maintained with reciprocal and enduring value? How can organizations meet expectations, innovate efficiently and develop knowledge, products and processes that will meet organizational and stakeholder needs? While these questions are complex, part of the solution can be found through evidence-based collaborative innovation.

The Phase 2 data collection period ended in August 2008 and data analysis is in progress. Data has been collected from 51 unique projects and 82 principle and co-investigators. Preliminary results show empirical support for the hypothesis that triple helix collaboration leads to greater innovation. Further analyses on the complete data set will occur over the final six months from which trends, specific conclusions and future research will be gleaned.

The Year 2 testbed environment has been successfully established. This environment will provide an iterative process for examining the capacity of Year 1 derivative models, best practices, indices and outcomes to promote collaborative innovation. Five testbed initiatives are underway representing triple helix collaborative Communities of Practice, for various topics and geographic locales. The aim is to develop distributed networks with skills and tools that will create efficiencies; allow faster translation of empirical knowledge into marketable products; create more transparent technology transfer; and, realize advances in the development of complex computational methodologies for accelerating innovation for economic and social benefit.

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Appendices

Appendix A – Request for No-Cost Extension
Appendix B – Revised Budget
Appendix C – Statement of Work and Revised Timeline
Appendix D – Management Review Findings
Appendix E – Strategic Plan Highlights
Appendix F – Communities of Practice Tools, Methods, Templates
Appendix G – 2008 Summit Announcement
Appendix H – Novation Requirement
Appendix I – ANSI Standards Developer Accreditation Letter
Appendix J – Example of Formatted Case Study
Appendix K – Global Observatory for e-Health Participants
Appendix L – Scholarly Residency – Bellagio Study and Conference Center
Appendix M – GOe Bellagio Presentation
Appendix N – Modular knowledge, Knowledge Clusters, and Transformative Networks – University of New Castle
Appendix O – International Knowledge and Capital Flows: Modular Knowledge and Transformative Networks – 2008 Summit
Appendix P –The National Forum on the Future of the Defense Health Information System -- The Triple Helix of Collaborative Interoperability: Industry Roundtable
Appendix Q – National Forum Panelists
Appendix R – National Forum Registration
Appendix S - US PACOM: Collaborative Innovation, Transformative Networks, and Synchronized Multi – Disciplinary Teams
Appendix T – Triple Helix Knowledge Clusters: Accelerating Innovation and Creating Transformative Networks (Book Chapter)